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THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY

of the

TOWN OF GANANOQUE

COUNTY OF LEEDS

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1964

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Environment Ontario



Environmental Survey

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Etobicoke, Ontario M9P 3V6
Canada

Report

on a

WATER POLLUTION SURVEY

of the

TOWN OF GANANOQUE

in the

COUNTY OF LEEDS

Division of Sanitary Engineering

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WATER POLLUTION SURVEY

of the

TOWN OF GANANOQUE

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Map of the Town of Gananoque

WATER POLLUTION SURVEY
of the
TOWN OF GANANOQUE

INTRODUCTION

This survey was made in response to a request by officials of the Town of Gananoque. Material characteristic of raw sewage had been observed floating near the upper dam on the Gananoque River, and it was requested that a thorough check be made to ascertain if any sewage is gaining access to the Gananoque River and the St. Lawrence River within the town boundaries. Surveys of this type are made by the Ontario Water Resources Commission for the purposes of locating and recording sources of existing and potential water pollution. Inquiries and investigations are made with respect to outfalls which discharge to the various watercourses. Samples are collected to determine the significance of the outfalls and their effects on the receiving streams. Where pollution sources are noted, recommendations pertaining to the abatement of these sources are made to the parties concerned.

Valuable assistance was received from the following officials.

Mr. L. F. Bowman, Clerk, Town of Gananoque;
Mr. E. Jackson, Road Superintendent, Town of Gananoque;
Mr. C. Beaubiah, Sewage Works Operator;
Mr. B. Young, Chief Public Health Inspector,
Leeds & Grenville Health Unit.

It is noted that the comments in this report pertain to conditions as they existed during this and previous surveys by this division, the Industrial Wastes Branch of the OWRC, and by

the Leeds & Grenville Health Unit. For reference purposes, a map of the Town of Gananoque is appended.

TOWN OF GANANOQUE

General

The Separated Town of Gananoque which is known as the Canadian Gateway to the 1000 Islands, is situated on the north shore of the St. Lawrence River approximately 20 miles east of the City of Kingston. This town of some 5,000 people is a summertime tourist centre with numerous tourist attractions and accommodations catering to some 3 million people who visit the 1000 Islands annually.

The Gananoque and St. Lawrence Rivers

The town is divided into an east and a west section by the Gananoque River which has its source in the northern area of the County of Leeds and its mouth at the St. Lawrence River within the municipality. In the Gananoque River, water control dams are located north and south of King Street.

Water Supply

The municipal water treatment plant is located in the south-western section of the town. The St. Lawrence River is the source of supply. Treatment by chlorination is provided. Water storage is effected by means of a 157,000-gallon standpipe.

Surface Water Drainage

Surface drainage flows discharge to ditches leading to the Gananoque and St. Lawrence Rivers, and to the municipal storm sewer system. The storm sewers discharge directly to the rivers, or in some cases to ditches leading to the rivers.

Sewage Works

Sewage Works for the municipality is comprised of the sanitary sewers, six pumping stations, and a waste stabilization pond. The pumping stations are located as shown below with emergency overflows to local watercourses.

<u>Location of Pumping Station</u>	<u>Overflow</u>
temporary pumping station located at Stone Street and Emma Street	Stockinghill Creek
pumping station near Stone and Georgina Street	Gananoque River
pumping station at River Street and Fourth Street	Gananoque River
pumping station at Main Street and Water Street	St. Lawrence River
sewage ejector station at the west side of the Water Street bridge	Gananoque River
pumping station at King Street East near Highway 401	to ditch to St. Lawrence River

Reportedly, the observation of raw sewage floating in the Gananoque River was the result of an overflow from one of the northerly pumping stations. No overflows were occurring during this survey. The Main Street pumping station collects raw sewage flows from the western portion of the municipality and pumps it through a force main to the King Street pumping station which receives the total raw sewage flow from the municipality. This station pumps the sewage the remaining distance to the waste stabilization pond, which is located just north of Highway 401. A sewage ejector pumping station pumps raw sewage from the manhole to the force main on

the east side of the Gananoque River.

The waste stabilization pond consists of three cells with a total surface area of 69.94 acres. Distribution of the raw sewage can be manipulated to effect series or parallel operation of the cells. The stabilized effluent flows to Stockinghill Creek which in turn discharges to the Gananoque River just north of Emma Street. Due to the minimal flow in Stockinghill Creek, it is evident that the lagoon effluent would comprise the total flow in this watercourse during certain periods of the year. The following results are those obtained to-date from samples taken from the waste stabilization lagoon.

<u>Date</u>	Raw Sewage		Cell #1		Cell #2	
	<u>BOD</u>	<u>Susp. Solids</u>	<u>BOD</u>	<u>Susp. Solids</u>	<u>BOD</u>	<u>Susp. Solids</u>
Sept. 16/64	---	---	8.8	78	16	58
Oct. 9/64	255	240	5.4	39	--	--

<u>Date</u>	Cell #3		<u>Coliform Organisms</u>	<u>Per Cent Reduction</u>	
	<u>BOD</u>	<u>Susp. (Effluent) Solids</u>		<u>BOD</u>	<u>Susp. Solids</u>
Sept. 16/64	4.0	22	7,300	---	---
Oct. 9/64	7.2	5	19,000	97.1	97.8

The low concentrations of BOD and suspended solids in the final effluent and the high treatment efficiency obtained indicate satisfactory stabilization of the raw sewage.

Considerable concern has been expressed by the townspeople as well as officials regarding the presence of a miniature aquatic plant known as "Lemma" (Duckweed) which has been observed floating on the surface of the waters of Stockinghill Creek and the Gananoque River. Reportedly, the occurrence of this plant has increased considerably during this year, and since the commencement of operation of the municipal oxidation pond. Although this is not considered indicative of excessive pollution, it is the intention of the Biology Branch of the Commission to make further studies regarding this matter during the coming summer.

Industry

The following principal industries are located in the Town of Gananoque:

<u>Name of Firm</u>	<u>Product</u>
Cow & Gate (Canada) Limited	Dried milk products
Cunninghams Bakery	Bakery products
Gananoque Electric Light & Water Supply Company	Electricity
Leeds Bridge & Iron Works	Structural steel & tank fabrication
Maplecroft Dairy Limited	Dairy products
Mitchel & Wilson Limited	Lumber & building supplies
Ontario Steel Products	Plastic
Parmenter & Bullock Mfg. Co.	Rivets and rivet setting machines
Staebler and Baker Company Ltd.	Recording charts
Steel Company of Canada	Drop forgings
St. Lawrence Steel and Wire Company Limited	Metal trimmings for wearing apparel
Gulton Industries	Electronic ceramics
Thompson(Canada) Rivet Co.Ltd.	Rivets and riveting machines
Aerofin Corporation	Heat exchangers



The Cow and Gate (Canada) Limited plant has four drains which discharge to the St. Lawrence River. In addition to the discharges from a platform drain, the refrigeration room, and the boiler room, the main outfall which is submerged discharges industrial wastes including wash waters, milk spillages, and sanitary wastes to the St. Lawrence River. This company has employed a consulting engineer for the purpose of intercepting its drains and separating contaminated flows from uncontaminated flows. It is proposed that contaminated wastes will be discharged to the municipal sanitary sewer system.

The St. Lawrence Steel and Wire Company Limited discharges all of its plating department wastes along with sanitary wastes which are untreated to the Gananoque River. The following composite sample of this waste collected from 10:30 a.m. to 4:00 p.m. June 26, 1964 is noted below:

<u>5-Day BOD</u>	<u>Solids Susp.</u>	<u>Diss.</u>	<u>Cyanide as HCN</u>	<u>Zinc as Zn</u>	<u>Copper as Cu</u>	<u>Nickel as Ni</u>
36	3282	1272	8.4	0.4	9	33

The strength of the wastes in this discharge is far in excess of the Commission's objectives for discharge to a watercourse.

The results of samples collected from the discharges from both the Ontario Steel Products plants were not excessive. However, a slightly high coliform count was obtained as well as a slight ether solubles count which indicates the presence of oil in the sample taken from the discharge from Plant #1.

A sample collected from the industrial waste discharge from the Steel Company of Canada plant revealed satisfactory

results. Since this premises is not served by the municipal sanitary sewers, sanitary wastes are discharged via a submerged outfall to the Gananoque River.

Although the Link Company and the Jones Shovel Company have not been operating for some time, it is reported that submerged sanitary outfalls from these premises may exist.

Wastes from the other major industries such as the Thompson (Canada) Rivet Company, Parmenter & Bullock Mfg. Company, and the Maplecroft Dairy are discharged to the sanitary sewer system.

There are instances where excessive volumes of uncontaminated wastes such as cooling and condenser water are discharged to the sanitary sewers resulting in unnecessary hydraulic overloading. Conversely, wastes in excess of Commission objectives for discharge to the municipal sewers are directed to the sewers in some instances. These are wastes which may be high in suspended solids or chemical concentrations such as cyanide from plating operations. Excessive chemical contamination can be hazardous to sewer workers or toxic to biological treatment processes.

Consequently, it is felt that the adoption of a sewer use by-law by the town would be very valuable. Such a by-law would indicate the exclusion of uncontaminated waste waters from the municipal sanitary sewers and regulate the strength of wastes which are discharged thereto.

Garbage Disposal

The municipal garbage dump is located on Old South Lake Road near Stockinghill Creek. Incineration as well as a landfill disposal method are utilized. During this survey, it was noted that garbage had been deposited very near the creek bank without benefit of earth covering. Although the results of samples collected downstream of the dump did not show excessive counts, it is conceivable that considerable seepage from the area could occur.

Recreation

Extensive use is made of the river waters for both swimming and boating purposes. The Rotary Beach is quite a popular swimming area. Samples collected by Commission staff and those collected by the Leeds and Grenville Health Unit during the summer did not reveal unusually excessive coliform counts.

In the summer months, numerous pleasure craft utilize the docking facilities in the town. Intermittent pollution from the sanitary facilities serving these craft may occur to an extent which is not immediately known.

The Canoe Club of Gananoque has a submerged sanitary waste outfall to the St. Lawrence River. A slightly excessive coliform count was noted at this area during the July sampling survey.

Similarly, the waste from the septic tank serving the Gananoque Boat Lines building discharges via a submerged outfall to the Gananoque River.

SAMPLING PROCEDURE

Samples were collected from the Gananoque River, the St. Lawrence River, and from evident discharges to the water-courses. Bacteriological examination and sanitary chemical analysis were performed at the Ontario Water Resources Commission Laboratory in Toronto. The sample results are listed in the appendices to this report. The sampling point locations are indicated on the appended map. Seasonal weather prevailed during the survey.

INTERPRETATION AND SIGNIFICANCE OF LABORATORY RESULTS

Bacteriological Examination

The Membrane Filter Technique is employed to obtain a direct enumeration of coliform organisms and is reported per 100 millilitres (ml) of the sample. The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. The maximum limit of 2,400 coliform organisms per 100 millilitres is the OWRC objective for bacteriological quality of surface water in Ontario.

Sanitary Chemical Analyses

Biochemical Oxygen Demand (BOD): The BOD of sewage, industrial wastes or polluted waters, is the oxygen required during stabilization of the decomposable organic material by aerobic biochemical action. A 5-day BOD determination with incubation at 20 degrees Centigrade is reported. A high BOD is indicative of organic or chemical pollution. The Commission objective for surface-water quality is an upper limit of four (4) parts per million (ppm).

Solids: The value for total solids, expressed in parts per million (ppm), is the sum of the values for the suspended and dissolved matter in the water. Concentration of suspended solids, which indicates the measure of undissolved solids of organic or inorganic nature is generally the most significant of the solids analyses in regard to surface-water quality. The effects of suspended solids in water are reflected in difficulties associated with water purification, deposition in streams, and injury to the habitat of fish.

Other specific analyses were performed where deemed necessary to evaluate the aspects of water quality. Some of these include tests for cyanide, zinc, copper and nickel.

Listed below are some of the pertinent maximum allowable concentration limits of contaminants in storm sewer, sewage treatment plant, and industrial waste discharges. Adequate protection of surface waters, except in certain specific instances influenced by local conditions, should be provided if the following concentrations and pH range are not exceeded.

5-day BOD	- 15 ppm
Suspended Solids	- 15 ppm
Phenol	- 20 ppb
Iron	- 17 ppm
Oil (Ether Solubles)	- 15 ppm
pH range	- 5.5 to 10.6

SAMPLE RESULTS

Generally satisfactory conditions with respect to the sanitary quality of the water were noted in the Gananoque and St. Lawrence Rivers. Slightly high coliform counts were obtained from samples of the St. Lawrence River water taken at the foot

of William Street, the Canoe Club, the Customs Dock, and at the Cow & Gate (Canada) Limited plant. Samples obtained from Stockinghill Creek revealed generally satisfactory conditions with respect to the sanitary quality of this watercourse.

In relation to industrial wastes, amounts in excess of Commission objectives for discharge to a watercourse were obtained in the samples of industrial waste which was discharging from the Cow & Gate Limited plant. Similarly, excessive counts were noted in the discharge from the St. Lawrence Wire & Cable Company Limited. In addition, excessive concentrations of copper, chrome, zinc, and cyanide were noted.

At the Ontario Steel Products Plant #1, a slightly high coliform count was noted in the discharge sample. Also, a small ether solubles count was obtained which indicates the presence of oil. This count, however, was not over the Commission objective.

POLLUTION SOURCES

It is evident that the establishment of sewage treatment works in the Town of Gananoque has eliminated a major source of water pollution, i.e., the discharging of untreated sewage to the local watercourses.

The lack of flow in the storm sewers on both periods of observation would indicate that no sewage or very little sewage was gaining access to these sewers. However, it is noted that two of the main storm sewers which are submerged in the St. Lawrence River were not sampled.

The remaining sources of industrial waste pollution

are the Cow and Gate (Canada) Limited plant and the St. Lawrence Wire and Cable Company Limited.

In addition to the industrial waste sources, the remaining main sources of pollution are the various submerged sanitary waste outfalls. During this survey the existence of these was noted at the Steel Company of Canada plant, the Cow & Gate (Canada) Limited, the Gananoque Boat Lines, and the Gananoque Canoe Club. It is quite probable that there are further outfalls of this nature some of which may be from private dwellings. The extent of these can only be determined by individual dye testing of sanitary facilities. It would therefore appear that a programme of locating these premises along the shores of the watercourse and subsequent elimination of outfalls is desirable. In many cases, pumping may be required in order to reach the level of the municipal sanitary sewers.

It is quite probable that seepage from the municipal garbage dump may be entering Stockinghill Creek. Generally accepted practise in a landfill area provides for the construction of a dyke of impervious material to prevent seepage from gaining access to the watercourse.

SUMMARY

In addition to some industrial pollution, the remaining sources of pollution in the Town of Gananoque are the various submerged sanitary waste outfalls. A potential pollution source is the municipal garbage dump.

RECOMMENDATIONS

1. A suitable sewer-use bylaw should be adopted by the town.
2. The submerged sanitary waste outfalls located during this survey at the Steel Company of Canada, Cow & Gate (Canada) Limited, the Gananoque Boat Lines, and the Canoe Club should be eliminated.
3. The Town of Gananoque should adopt a programme of detection of all of the submerged sanitary outfalls to the Gananoque and St. Lawrence Rivers. Agreement with the responsible parties should be sought whereby these premises would be connected to the municipal sanitary sewer system. This in some cases, may involve the use of sewage pumps.
4. Efforts should be made by the Town of Gananoque to prevent seepage from the municipal garbage disposal site from gaining access to Stockinghill Creek. This may be accomplished by the construction of an impervious dyke.
5. The Cow and Gate (Canada) Limited should continue an active programme of working towards effective waste treatment.
6. The St. Lawrence Steel and Wire Company Limited should provide effective treatment of its wastes in order to prevent discharge of untreated wastes to the Gananoque River.

All of which is respectfully submitted

District Engineer

J. K. Theil

Prepared by:
M. Holy
/mh

Approved by

K. H. Sharpe, Director

TABLE I

SAMPLE POINTS PERTAINING TO THE ST. LAWRENCE RIVER

SAMPLE POINT NO.	DATE	DESCRIPTION OF SAMPLING POINTS	TURBI- DITY UNITS	5-DAY BOD (PPM)	S O L I D S			TOTAL COLIFORMS PER 100 ML
					TOTAL	SUSP.	DISS.	
S.L. 120.5-R	OCT. 8/64	PUMPING STATION - OVERFLOW TO ST. LAWRENCE RIVER			NO FLOW			
S.L. 128.8-W		EAST WARD STORM SEWER OUTFALL			NO FLOW			
S.L. 120.9	SEPT. 16	ST. LAWRENCE RIVER AT FOOT OF WILLIAM ST.	2.0	0.8	234			18
	JULY 9	" "						16,000
S.L. 121.1	JULY 9	ST. LAWRENCE RIVER AT CANOE CLUB		1.2	2.0	6	204	3,900
S.L. 121.5	SEPT. 16	ST. LAWRENCE RIVER AT CUSTOMS DOCK		0.9	212		2.9	4,000
	JULY 9	" "						138
S.L. 121.5-R	"	PUMPING STATION -OVERFLOW TO GANANOQUE RIVER			NO FLOW			
S.L. 121.5-W	"	SUBMERGED STORM SEWER OUTFALL NEAR CUSTOMS DOCK			SEWER SUBMERGED - NO SAMPLE TAKEN			
S.L. 121.6	SEPT. 16	ST. LAWRENCE RIVER AT COW AND GATE	2.0	2.3	222			2,700
	JULY 9							2,000
S.L. 121.6-W	SEPT. 16	COW AND GATE - MAIN INDUSTRIAL WASTE OUTFALL		9.6	218	8	210	800,000
-1								
S.L. 121.6-W	SEPT. 16	COW AND GATE OUTFALL FROM REFRIGERATION ROOM		1.1	218	3	215	1,900
-3								
S.L. 121.8	SEPT. 16	ST. LAWRENCE RIVER AT ROTARY BEACH	2.0	0.7	210			12
	JULY 9							108
S.L. 121.9-W	SEPT. 16	WEST WARD STORM SEWER OUTFALL			NO FLOW			
	OCT. 8				NO FLOW			
S.L. 122.1	JULY 9	ST. LAWRENCE RIVER AT PARK AT FOOT OF OSBORNE STREET						234
	SEPT. 16			1.8	1.1		234	

TABLE II
SAMPLE POINTS PERTAINING TO THE GANANOQUE RIVER AND STOCKINGHILL CREEK

SAMPLE POINT NO.	DATE	DESCRIPTION OF SAMPLING POINTS	TURBI- DITY UNITS	5-DAY BOD (PPM)	S O L I D S			TOTAL COLIFORMS PER 100 ML
					TOTAL	SUSP.	DISS.	
G. 0.0	SEPT. 16	GANANOQUE RIVER AT WATER STREET BRIDGE	2.8	1.2	156			1,100
	OCT. 8			1.7	198	3	195	
G. 0.0-W		SUBMERGED STORM SEWER OUTFALL - SOUTH SIDE OF WATER ST. BRIDGE			SEWER SUBMERGED - NO SAMPLES TAKEN			
G. 0.0-R	SEPT. 6	EJECTOR STATION - OVERFLOW			NO FLOW			
G. 0.1-W	SEPT. 16	STORM SEWER OUTFALL TO EAST BANK OF GANANOQUE RIVER BETWEEN WELLINGTON STREET AND ARTHUR STREET			NOT LOCATED			
G. 0.3-I	SEPT. 16	OUTFALL FROM ONTARIO STEEL PRODUCTS PLANT #1 ETHER SOLUBLES = 0.2		0.8	182	3	179	2,600
G. 0.35-I		OUTFALL FROM ST. LAWRENCE WIRE & CABLE COPPER AS CU - 0.6 ZINC AS ZN - 0.3 CHROME AS CR - 0.04 CYANIDE AS HCN - 1.1		8.0	748	143	605	<10
G. 0.4	AUG. 8	GANANOQUE RIVER AT HWY. 2 BRIDGE		1.1	184	4	180	130
	SEPT. 16		2.9	3.6	170			18
	SEPT. 30		2.6	1.2	170			152
	NOV. 30		1.7	2.2	176	9		330
G. 0.4-W	SEPT. 6	STORM SEWER TO THE WEST BANK OF THE GANANOQUE RIVER JUST NORTH OF KING ST.			NO FLOW			
	OCT. 8				NO FLOW			
G. 0.5-W	SEPT. 16	STORM SEWER TO THE WEST BANK OF THE GANANOQUE RIVER ON THE NORTH SIDE OF FIRST STREET.			NO FLOW			
	OCT. 8				NO FLOW			
G. 0.6-W	SEPT. 16	STORM SEWER TO WEST BANK OF GANANOQUE RIVER AT RAILWAY TRACKS			NO FLOW			
	OCT. 8				NO FLOW			
G. 0.65-I	OCT. 8	SUBMERGED OUTFALL FROM STEEL COMPANY OF CANADA		1.1	166	1	165	50
G. 0.7	SEPT. 16	GANANOQUE RIVER AT NORTH ST.	1.5	2.8	176			1,700
	OCT. 8			1.4	156	3	153	
G. 0.8-W		STORM SEWER OUTFALL TO THE EAST BANK OF THE GANANOQUE RIVER BETWEEN NORTH ST. AND GEORGINA ST.			NOT LOCATED			
G. 0.9-R-1	SEPT. 16	PUMPING STATION - EMERGENCY OVERFLOW			NO FLOW			
G. 0.9-R-2	SEPT. 16	PUMPING STATION - EMERGENCY OVERFLOW			NO FLOW			
G. 1.0-W	SEPT. 16	STORM SEWER OUTFALL TO SOUTH BANK OF GANANOQUE RIVER AT THE NORTH END OF RIVER STREET			NO FLOW			

TABLE II CONTINUED

SAMPLE POINT NO.	DATE	DESCRIPTION OF SAMPLING POINTS	TURBI- DITY UNITS	S O L I D S			TOTAL COLIFORMS PER 100 ML
				5-DAY BOD (PPM)	TOTAL	SUSP.	
G.S.H. 1.0	SEPT. 16	STOCKINGHILL CREEK AT GANANOQUE RIVER	3.5	1.3	178		14
	OCT. 8			2.4	364	9	355
G.S.H. 1.0-R		TEMPORARY PUMPING STATION OVERFLOW		NO FLOW			
G.S.H.-1.1-D	SEPT. 16	DITCH OUTFALL TO THE SOUTH BANK OF STOCKINGHILL CREEK AT HENRIETTA ST.		NO FLOW			
G.S.H. 1.3		STOCKINGHILL CREEK AT OLD SOUTH LAKE ROAD	6.5	2.4	368		690
G.S.H. 1.6		STOCKINGHILL CREEK ABOVE GANANOQUE GARBAGE DUMP	7.0	3.6	358		156
G. 1.2-D	SEPT. 16	DITCH WHICH DISCHARGES TO THE WEST BANK OF THE GANANOQUE RIVER NORTH OF FOURTH STREET		NO FLOW			
G. 1.6-I		COOLING WATER OUTFALL FROM ONTARIO STEEL PRODUCTS PLANT #2	0.7	176	14	162	166
G. 1.8		GANANOQUE RIVER AT HIGHWAY 401	1.4	0.9	166		70



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